

DEPARTMENT OF EDUCATION
PAPUA NEW GUINEA

No. 1

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF EQUIPMENT
FOR
THE PAPUA NEW GUINEA UNIVERSITY OF
TECHNOLOGY
IN
PAPUA NEW GUINEA**

MARCH 1997

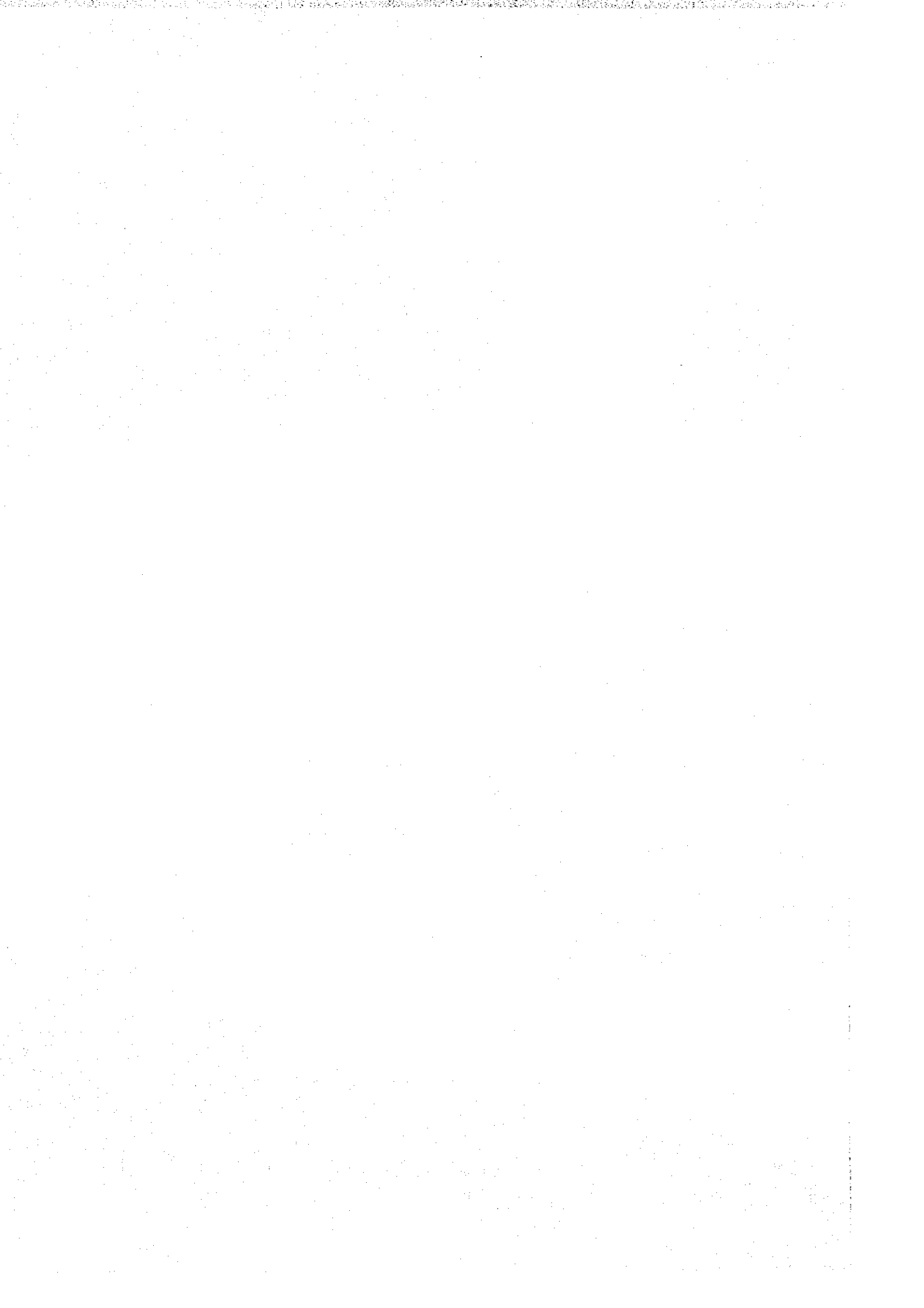
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UNICO INTERNATIONAL CORPORATION**

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PREFACE

In response to a request from the Government of Papua New Guinea the Government of Japan decided to conduct a basic design study on the Project for Improvement of Equipment for the Papua New Guinea University of Technology and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Papua New Guinea a study team from November 20 to December 17, 1996.

The team held discussions with the officials concerned of the Government of Papua New Guinea and conducted a field study at the study area. After the team returned to Japan, further studies were made, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Papua New Guinea for their close cooperation extended to the teams.

March 1997



Kimio Fujita

President

Japan International Cooperation Agency

March 1997

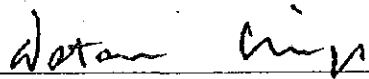
LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Improvement of Equipment for the Papua New Guinea University of Technology in Papua New Guinea.

This study was conducted by UNICO International Corporation, under a contract to JICA, during the period from November 13, 1996 to March 31, 1997. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Papua New Guinea and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



Wataru Shiga

Project Manager,

Basic design study team on the Project for

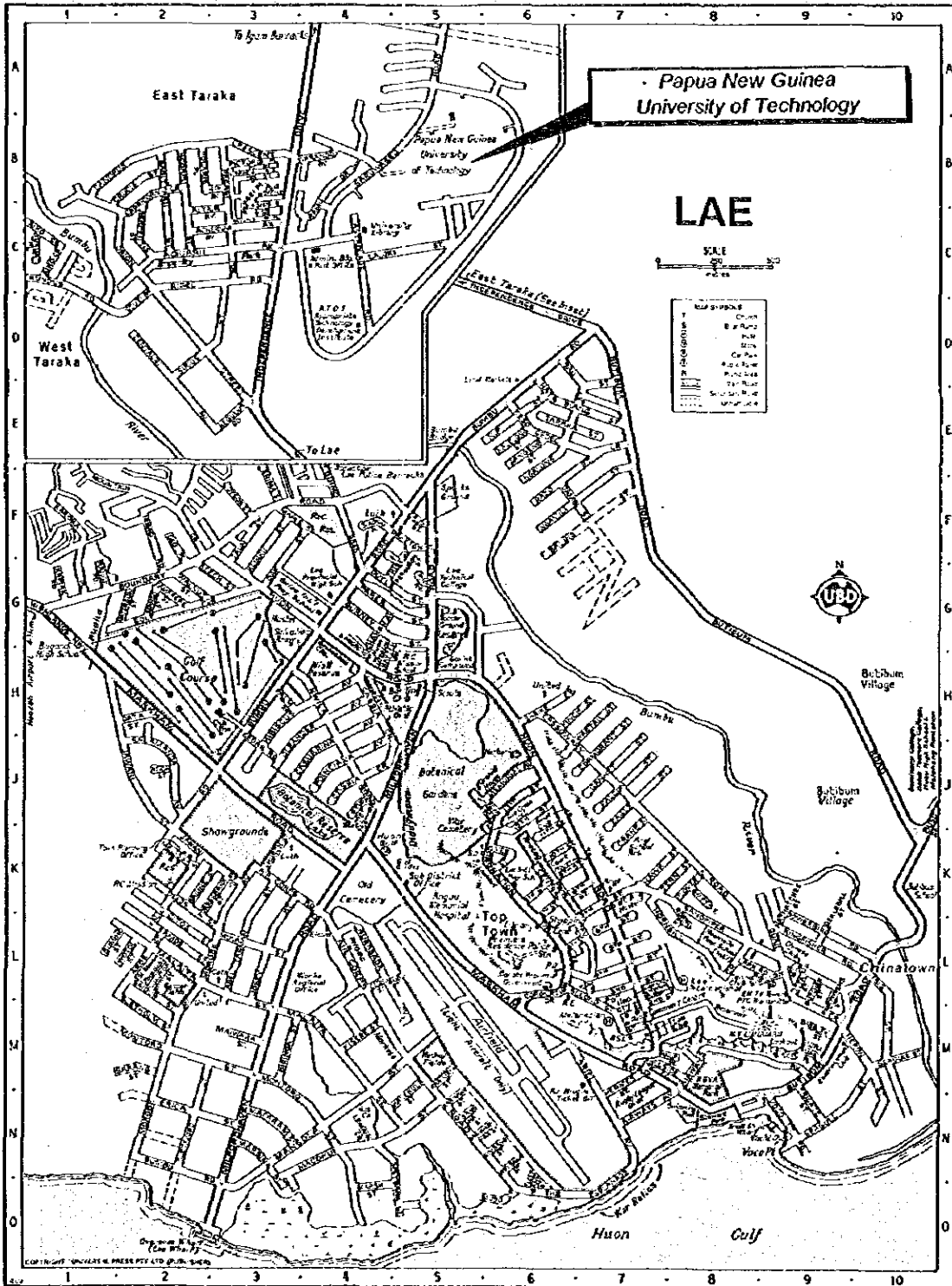
Improvement of Equipment for the Papua

New Guinea University of Technology,

UNICO International Corporation

LOCATION MAP

(Papua New Guinea University of Technology)



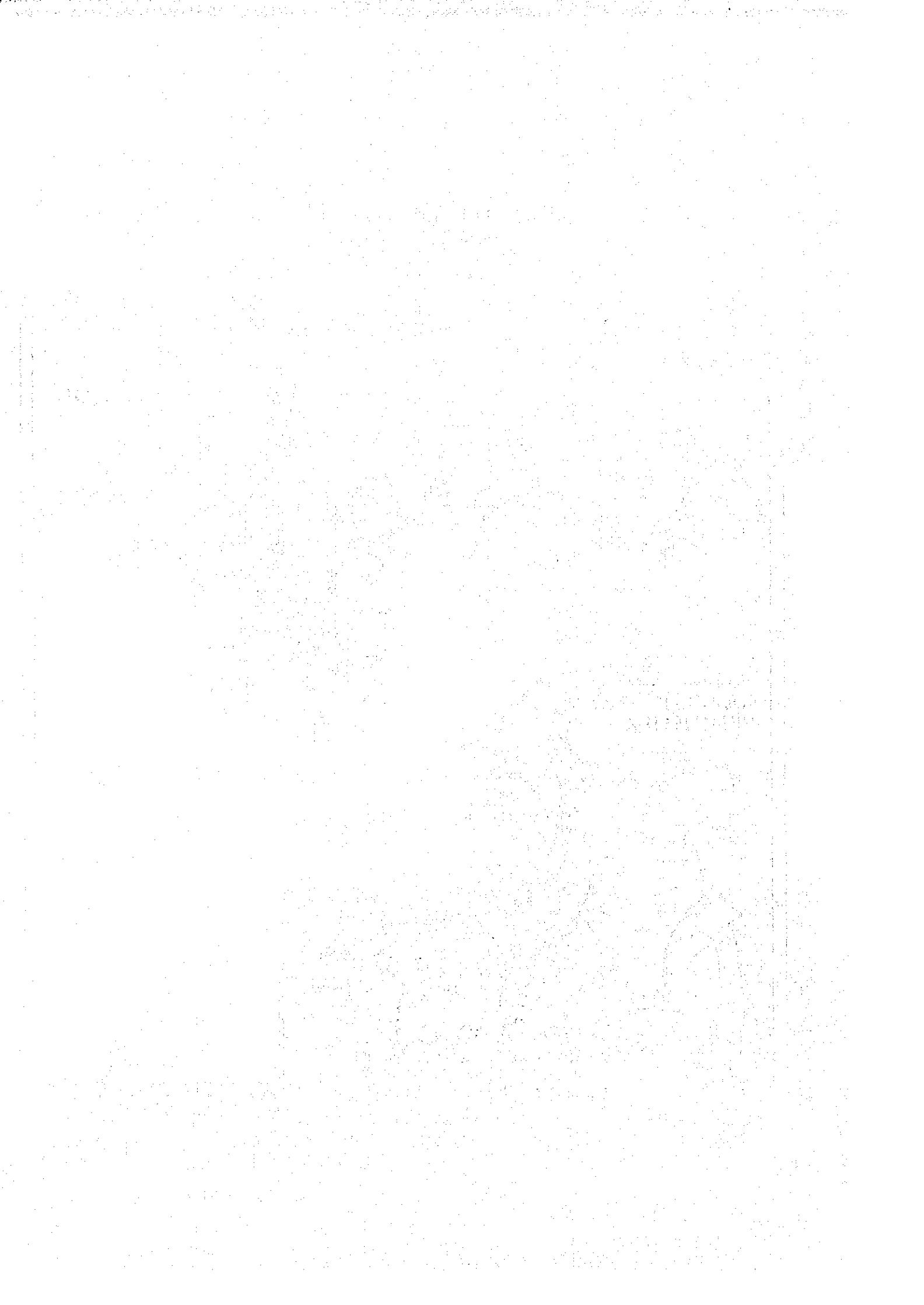


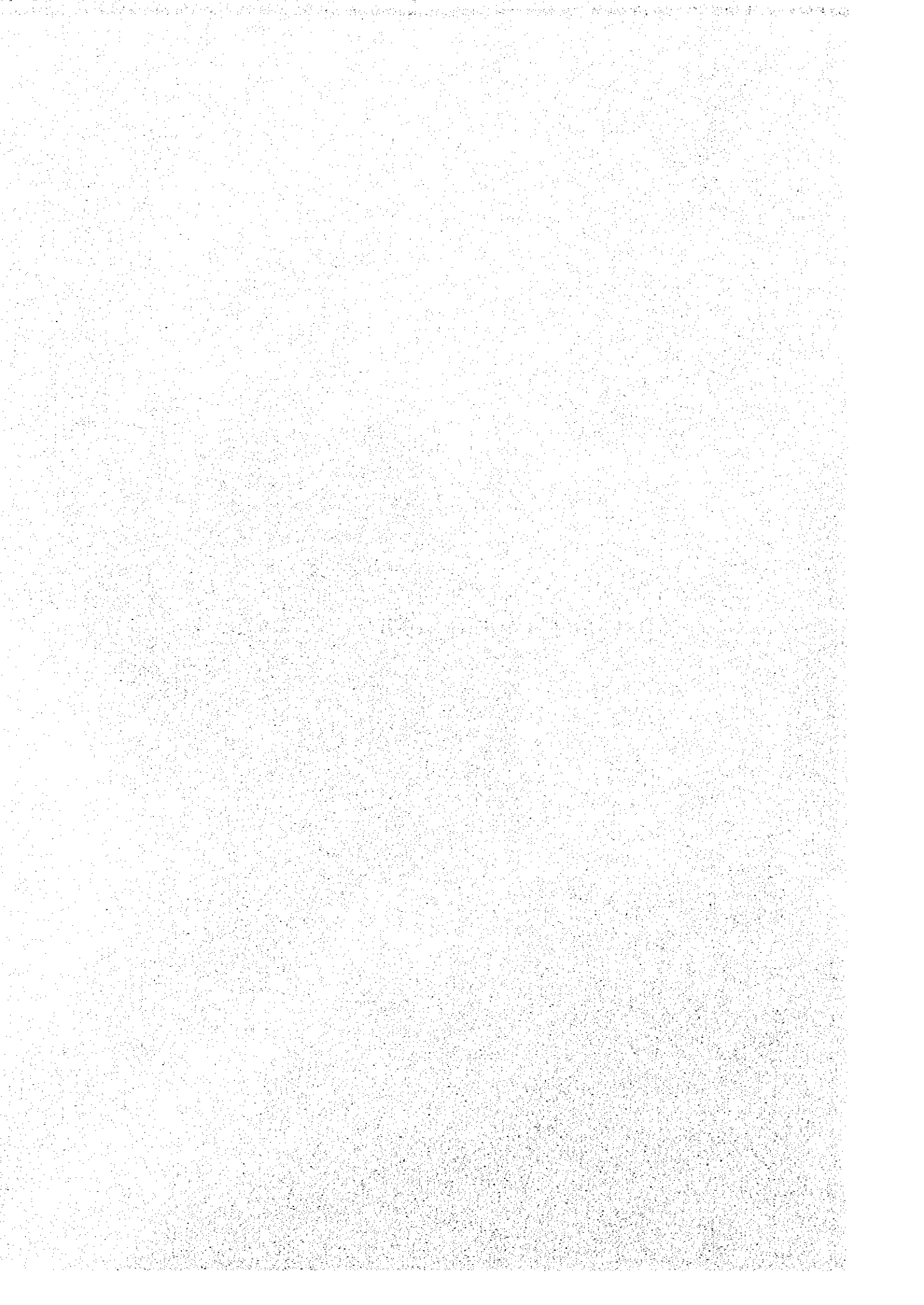
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CHAPTER 1 BACKGROUND OF THE PROJECT



CHAPTER 1 BACKGROUND OF THE PROJECT

(1) Introduction

The total land area of Papua New Guinea (abbreviated as PNG hereinafter) is about 460,000 square kilometres, nearly 1.25 times the area of Japan. It is located between 0° - 12° S. Lat. and 141° - 160° E. Long. Eighty-eight percent of the total land area is in the eastern portion of the island of New Guinea. The remaining part consists of more than two hundred islands. PNG is the largest island country in the South Pacific. Eighty percent of the total land area is covered with forests. The country is divided into north and south by a series of high central mountain ranges which extend over almost the entire length of the country. Mt. Wilhelm is the highest point in the country, rising to 4,509 m. The country is surrounded by exclusive marine jurisdictional zone of 2.3 million square kilometres. The country is abundant in forest resources, mineral resources and fishery resources.

The average increasing rate of real GNP is 0.6 % between 1980 and 1993. The average inflation rate is 4.8 % during the same period. The industrial breakdown of real GDP in 1993 is as follows: Agriculture, forestry and fisheries 27 %; Mining 29.7% ; Manufacturing 7.3%; Commerce, transportation, finance 15.2% ; Public sector and services 12.6%. Agriculture including forestry and fisheries is the most important sector in the economy of Papua New Guinea, accounting for about 30% of GDP on the average between 1980 and 1990, and employs 85% of the economically active population. In recent years the development of mineral resources is proceeding apace with the introduction of foreign capital and technology. Production of gold, silver and copper is increasing and is making a significant contribution to the economy of PNG. Production of petroleum started in 1992. Mineral products are the biggest exports accounting for nearly 80% of the total exports. In the beginning of 1990's new foreign capital was injected in succession in the development of mineral and petroleum resources. As the result, the economy of PNG was activated and the growth rate of GDP recorded 16.5% in 1993. However, the production of petroleum declined in 1994. With the decline of mineral products export the economic growth rate declined to 3.5%. In 1995 the eruption of a volcano in Rabaul reduced agricultural production and the economic growth rate declined to minus 5.4%. The growth rate in 1996 is predicted to be 0.3% since the mineral products export is still sluggish. The industrial structure of

PNG is easily influenced by the natural conditions, weather and climate conditions and fluctuations of international market prices. Mineral resources account for much of the export revenue. However, the Government recognises that the high economic growth through the development of mineral resources and their export is not expected to continue because mineral resources are under the control of international capital market in their development, production and sales. In these circumstances, the Government now places emphasis on the development of agriculture, forestry, fisheries and manufacturing (light industries).

A lot of expatriate experts are employed on a contract basis by government offices, the private sector, research institutions and educational institutions and are playing important roles. The number of these expatriates is estimated about thirty thousand. The personnel expenses to employ them are not insignificant affecting the national finance. The Government is carrying out a localisation programme which aims at replacing expatriates with local professionals, ending the dependence on foreign expertise and building up a self-reliant nation. In order to achieve the aims, various measures are being taken such as the creation of employment in urban areas as well as in rural areas, the increase of production and the development of professional manpower. The Papua New Guinea University of Technology and the University of Papua New Guinea are expected to play a critical role in the development of professional manpower.

(2) Background of the Project

The Papua New Guinea University of Technology was established in May 1965 as the Papua New Guinea Institute of Higher Technical Education in Port Moresby. In 1968 it moved to a 200 hectare campus in the suburb of Lae and in March 1970 it became the Papua New Guinea Institute of Technology. The Institute finally achieved its present status in August 1973 when it became the Papua New Guinea University of Technology. It is the only technological university in the South Pacific, outside Australia and New Zealand. The objective of the University to produce professionals who can contribute to the development of science and technology in PNG as well as in the countries in the South Pacific and do high level research. It is a boarding school. From 37 students in 1967, the University has grown to a full-time student population of 2,027 including students from South Pacific countries (as of 1996, including students of

the affiliated colleges). From 4 graduates in 1970, the University has awarded 5229 degrees, diplomas and certificates.

The enrolment of students is shown in Table 1-1.

Table 1-1 Student Enrolment by Residential Academic Programmes (Full Year Students)

Year	1990	1991	1992	1993	1994	1995	1996
A. Taraka Campus							
Business Studies	297	309	313	337	380	393	408
Mathematics & Computer Science	-	-	-	15	36	66	85
Language and Communications	-	-	-	-	-	14	24
Applied Physics	6	-	-	-	-	8	25
Applied Science	114	114	131	132	141	154	137
Engineering							
Foundation Year	138	143	178	124	147	168	169
Civil	67	86	89	115	112	116	117
Electrical	141	134	146	124	129	139	158
Mechanical	78	73	77	86	105	125	127
Mining	19	71	61	81	73	66	56
Surveying & Land Studies	149	154	170	125	160	168	173
Architecture & Building	83	86	80	97	118	127	126
Agriculture	96	141	152	128	119	103	116
Forestry	50	67	78	66	78	67	63
Total Taraka Campus	1,238	1,378	1,475	1,430	1,598	1,714	1,784
Percentage Growth in full year students since 1990	0%	11%	19%	16%	29%	38%	44%
B. Vudal Campus			128	117	115	117	125
C. Buloto Campus					99	93	80
D. Buimo Campus (TITC) PETT Students only					31	31	38
Total All Campuses	1,238	1,378	1,603	1,547	1,843	1,955	2,027
Percentage Growth in full year students since 1990	0%	11%	29%	25%	49%	58%	64%

Source : Papua New Guinea University of Technology

The number of graduates is shown in Table 1-2.

Table 1-2 Number of Graduates

Course	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Postgraduate	4	1	5	3	5	3	0	11	6	2	7	4	51
Ph.D.	0	0	1	0	0	0	0	0	0	0	0	1	2
M.Sc.	0	0	0	1	0	0	0	0	0	0	0	0	1
M.Phil.	1	1	1	0	0	0	0	1	1	2	2	0	9
P.G.D.	3	0	3	2	5	3	0	10	5	0	5	3	39
Undergraduate	128	137	143	159	135	14	30	154	184	235	278	230	1,827
Bachelor	128	137	143	159	135	14	30	154	184	235	278	230	1,827
Others	93	72	116	155	135	20	39	105	174	144	122	193	1,374
Diploma	93	72	116	155	135	20	27	101	164	144	119	193	1,339
Certificate	0	0	0	0	0	0	12	4	10	0	3	6	35
Total	225	210	264	317	275	37	69	270	364	381	407	433	3,252

Source : Papua New Guinea University of Technology

The University is constituted of the principal school (Taraka campus in Lae) which has 13 teaching departments and one centre, and affiliated colleges (Vudal

Training College at Lac). The academic staff of a department consists of a professor (head of the department), associate professors, senior lecturers, lecturers and assistant lecturers. Equipment is maintained by the technical officers of each department. Outline of teaching departments in the Taraka campus and Vudal University College is as follows;

(A) Department of Civil Engineering

The first year in the four Engineering Departments (Civil, Electrical and Communication, Mechanical and Mining) is the Foundation Year common to these four Departments. In the second year subjects proper to civil engineering start. The intake quota of students is 30 every year. The Department offers a four-year degree course leading to the Bachelor of Engineering in Civil Engineering. Students who complete the first two years of the degree course and satisfy the examination are awarded an undergraduate diploma in Civil Engineering. The Department also offers a two-year postgraduate diploma course. The research subjects in the Department include concrete bridges, timber structures, sewage lagoons, sediment transport, soils for roads, earthquake resistant structures, soil properties, disaster research, rural water supply, and sanitation and waste management.

The Department is well equipped with basic teaching equipment and machine tools and is housed in four main buildings (Tololo Buildings) and a separate workshop. The Department also operates a laboratory to serve industry. The laboratory calibrates measurement instruments.

(B) Department of Electrical and Communication Engineering

The Department offers a four-year degree course in Electrical Engineering (the intake quota is 30 per year), and a three-year diploma course in Electrical Engineering with a high percentage of practical training. It also offers service courses on electrical engineering to students of other Departments and a Master course based on a research thesis. The Department has research programmes in microwave propagation (terrestrial and satellite communication), computer networks, microhydro generation, computer PCL and microprocessor control. The Department has two buildings that house electrical machines,

electronics instruments, communications and microwave laboratories and workshop facilities. It is well furnished with basic experimental equipment. In response to requests from industry the Department provides further training for graduate engineers.

(C) Department of Mechanical Engineering

The Department offers a four-year course leading to the degree of Bachelor of Engineering in Mechanical Engineering (the intake quota is 30 per year). An optional sandwich programme is available for students who have completed the third year. This programme provides students with industrial training for one year. This will extend the time to complete the degree requirements to five years. The Department also offers a one-year postgraduate diploma course in Energy Engineering and a two-year postgraduate degree course based on a research thesis.

There are several research projects including the development of low cost solar heating systems, and solar powered systems for water pumping and space cooling. The laboratories have a wide range of educational equipment in the fields of heat engines, vehicle technology, engineering materials science, applied dynamics and machine elements, heat transfer and combustion, refrigeration and air conditioning, flexible manufacturing cell, metrology, solar energy, fluid power and air flow. A CNC machining center is also available. These facilities are used not only by students but also for a contract research from the private sector.

(D) Department of Surveying and Land Studies

The Department offers four-year degree courses in surveying, cartography and land studies (the total intake quota is 70 per year) and diploma courses in surveying (two years), cartography (three years) and land administration (one year). Besides, there are a one-semester certificate course in land administration, a postgraduate diploma course in land studies and a master's degree course. The Department is also involved in a number of research programmes including volcanic deformation monitoring using GPS, development of the PNG resource information system, cartographic communication through

development of thematic maps, land valuation and management. The Department is equipped with a digital mapping, geographic information systems and remote sensing laboratory, GPS, a cartographic processing laboratory and automated surveying systems.

(E) Department of Mining Engineering

It is the newest Department established in 1988. In 1990 the Mineral Technology Section in the Department of Chemical Technology was transferred to this Department. The Department offers two four-year degree courses leading to a Bachelor of Engineering in Mining Engineering and a Bachelor of Engineering in Mineral Process Engineering. Two JICA experts have been assigned to the Department within the framework of technical cooperation. Dr. Yoichi Maru, ex-Professor of Ehime University had been assigned from 1992 to 1995 and Dr. Katsuo Ito of the Institute of Advanced Materials Processing, Tohoku University has been teaching analytical chemistry since 1996. Another expert will be sent from Tohoku University in April 1997. A new Mosely Moramoro Mining Building houses laboratories of mining engineering, rock mechanics, geology, mine planning and mineral process, and a computer laboratory. The laboratories are well equipped with basic equipment donated by private mining companies. The Laboratory of Mineral Process is equipped with an X-ray fluorescence analyzer and inductively coupled plasma apparatus, both provided by JICA (the latter being currently under process for procurement), and other analytical instruments.

(F) Department of Architecture and Building

Students enter a three-year diploma course and proceed to a two-year degree course thereafter. The intake quota is 35 per year. Beside these courses there is a two-year post graduate diploma course that is offered with the first year residence at the University of Papua New Guinea and the second year at Unitech. The programme provides training for planners in urban or rural development planning; environment planning; residential area planning; transportation and infrastructure planning. The Department undertakes a survey of traditional architecture under the auspices of the Papua New Guinea

Architecture Heritage Centre. The Department also serves as the secretariat of the National Committee for Urban Shelter which investigates appropriate housing solutions for the urban poor. There is a plan to start a course leading to the degree in Master of Architecture.

(G) Department of Agriculture

The Department offers a four-year course leading to the degree of Bachelor of Science in Agriculture. The course covers a wide range of agricultural sciences including agricultural engineering, animal production, agricultural economics etc. Beside the degree course, there is a one-year postgraduate diploma course which provides professional education in crop production, animal production, crop protection, agricultural economics, soil science and agricultural engineering. The Department accepts postgraduate students for M.Sc and Ph.D by research. The Department was initially established as a department of the University of Papua New Guinea in Port Moresby and then transferred to the Department of Agriculture and Livestock. It was incorporated into the Papua New Guinea University of Technology in 1985. It has a farm of 39 hectares located on the campus. The main functions of the farm includes research into food crops and small animals in cooperation with the Department of Agriculture and Livestock.

(H) Department of Forestry

The Department offers a five-year course leading to the degree of Bachelor of Science in Forestry (the intake quota of 27 per year) and a two-year course leading to the degree of Bachelor of Forest Management, designed for holders of a Diploma in Forestry from the Bulolo Forestry College with at least three years of work experience in forestry. The students are required in the fourth year to undergo one year of work experience in private industries or with the Department of Forests. In 1994, PNG Forestry College in Bulolo and the Timber Industry Training College in Lae joined the University, and the Department now covers all fields of training and research in forestry.

(I) Department of Mathematics and Computer Science

The Department offers courses in mathematics to all students and a four-year programme leading to a Bachelor of Computer Science Degree (the intake quota is 30 per year). Students enter a two-year programme leading to a Diploma in Computer Science. Upon completion of the Diploma course, students may apply to the Bachelor Degree course of two years duration. Besides, the Department offers three Postgraduate Diploma Programmes: Engineering Mathematics, Mathematics and Computer Science.

The Department also accepts students for Master of Philosophy by research. There are two computer laboratories for students equipped with old model personal computers.

(J) Department of Business Studies

Students enter a two-year Diploma course in either of three areas: Accountancy, Management and Microcomputer Information Processing. Upon completion of the Diploma course students may apply to enter a two-year Bachelor degree course in either of the following four areas: Accountancy, Management, Information Systems and Business Economics. The total intake is 120 per year. Beside these courses, the Department offers a Diploma in Computer Programming on a part time basis only over a period of 2 - 4 years. The Department also provides service teaching to the students of Architecture and Building, Engineering, and Surveying and Land Studies Departments. Current research at the Department ranges from management and marketing practices in Papua New Guinea, cross-cultural managerial problems, accounting practices, the causes of failure of indigenously managed businesses and problems of projects planning in the public sector in liaison with the other departments of the University, government Departments, other tertiary educational institutions and the private sector. In the near future a programme of Master of Business Administration (MBA) will be started.

(K) Department of Applied Physics

The Department is responsible for the teaching of physics to the first year

students in all 11 science based departments of the University. The Department offers a four-year degree course entitled "Bachelor of Science in Applied Physics with Electronics and Instrumentation". It is designed to produce graduates with technical skills in electronics and instrumentation, together with a good understanding of the underlying physical principles. The final year syllabus includes electives, thereby enabling the students to select a suite of subjects best suited to their abilities and interests. In 1994 a laser physics laboratory and a laboratory of non-destructive testing were set up. Research interests in the Department are at present physics of materials, physics of the environment and physics education. M.Sc and Ph.D courses are being planned to start after 1997.

(L) Department of Applied Sciences

The Department is responsible for the teaching of chemistry to Agriculture, Forestry, Applied Physics and Engineering (Civil, Electrical and Communication, Mechanical and Mining) students. The Department offers three four-year degree courses leading to i) Bachelor of Science in Applied Chemistry, ii) Bachelor of Science in Food Technology and iii) Bachelor of Science in Human Nutrition (the total intake is 55 per year). Facilities are available to do postgraduate studies (M.Phil.) in applied chemistry, food technology and human nutrition. The Department also runs a one-year postgraduate diploma in applied chemistry. Research has been conducted in the following fields: applications of infrared spectroscopy, monitoring of heavy metals in mining effluent, ion chromatography, extraction and chemical composition of PNG medical and aromatic plants, chemical investigation into fossil fuels, functional properties of food ingredients, food quality assurance, microbiological status of processed food and so on.

(M) Department of Language and Communication Studies

The Department is a service department which offers 28 subjects to all students of the University. All first year students undertake work on learning and communication skills in this Department. In addition, students take, in subsequent years of their studies, such subjects as advanced language and

research skills, report writing, seminar presentations and communication in the work place. The Département also offers four professional courses in language and communication: a certificate course lasting one semester, an associate diploma course lasting two semesters, a diploma course lasting two years and a degree course lasting four years (the intake of 20 per year). All students enrolled in the professional programmes initially register for the certificate course. Admission into each of the three subsequent courses depends upon successful completion of the preceding one.

More than 700 languages are spoken in PNG, and English is used as a mean language in educational institutions. Proficiency in English is therefore a prerequisite for employment. The Department offers short courses under Unitech Development and Consultancy Company (UDC) in areas such as writing for business and time management, to fill the needs of particular companies and organisations. The Department also offers extramural classes in elementary and intermediate Tok Pisin, Hiri Motu, Mandarin, Japanese, Indonesian, French, and German. The Department has a 20-booth language laboratory and about 750 books mainly concerned with English language teaching and approximately 350 video tapes.

(N) Computer Services Centre

The University is currently setting up a computer network throughout the campus. About seventy percent of computers are connected through optical fibre cables. The Centre is responsible for the planning and configuring the network, purchasing hardware and software, and maintaining the system. The computer laboratories administered by the Centre are located in the buildings of Civil Engineering Department, the Surveying and Land Studies Department and the Mathematics and Computer Science Department. The computers in these laboratories are used by students in the lower grades during class hours and by any students after school hours.

(O) Vudal University College

The Vudal Agricultural College was established in 1965 in a suburb of Rabaul in the island of New Britain and was operated by the Department of

Agriculture, Stock and Fisheries offering a three-year diploma course in tropical agriculture. It had provided the national and local government organisations with middle-level agricultural manpower including agricultural extension workers. During the period between 1978 and 1983, there had been frequent revisions of the curriculum. Financial stringency resulted in a gradual deterioration of the facilities and the training programme was unable to keep up with the rapidly changing demands from the agricultural service industries for skilled graduates. In order to solve these problems the Government decided in 1991 to transfer the College from the Department of Agriculture, Stock and Fisheries to the Papua New Guinea University of Technology. In 1992, it was merged with the University of Technology and has been renamed Vudal University College. The College receives a five year assistance package from the New Zealand Government entitled the Agricultural Institution Strengthening Project since 1993. The project consists of staff development utilising twinning arrangements with New Zealand universities and colleges, training need analysis, curriculum review and development, provision of equipment for the library and farm review and strategic plan. While the Department of Agriculture in the Taraka campus places emphasis on the production of high-level professionals in agricultural science, the Vudal University College aims at providing middle-level professionals who work as leaders in plantations and farms to support degree level officers.

The University plays an important role in teaching, research, community development, and staff training and development. These activities have been outlined in the previous paragraphs. The Headquarters of the University is in the Taraka campus. Other facilities for these activities in the Taraka campus than the teaching departments are as follows:

a) Matheson Library

The Library is fully air-conditioned and has study desks for about 400 students. It holds about 120,000 books and subscribes about 3,000 periodicals.

b) Audio Visual Unit

It is part of the Library and has audio visual equipment (VTRs, video monitors, audio players etc.) and photographs, tapes, slides, films, discs etc.

c) Central Engineering Workshop

It is located in the Civil Engineering Department, but is independent of the Department. It consists of three sections: fitting and machining, welding and fabricating, and carpentry and joinery. It provides the teaching departments with support services such as maintenance of equipment, manufacture of laboratory items and research equipment, preparation of test specimens and maintenance of classrooms. It has machine tools (lathes, milling machines, grinders etc.), wood working machines, welding machines and so on.

d) Electronic Services Unit

While the Computer Service Centre maintains the computer systems and software, the Electronic Services Unit is responsible for the installation, maintenance and repair of electronics and electrical equipment, audio visual equipment, optical instruments, analytical instruments and the audio equipment of Duncanson Hall. It originally belonged to, but was separated from the Department of Electrical and Communication Engineering in order to serve all departments of the University. It has nine technical staff. Since it operates on a commercial basis, it will be merged with UDC in future.

e) National Analysis Laboratory (NAL)

This was established twenty five years ago to offer chemical analysis services on a commercial basis. It services the fields of pathology, food, water, soil and foliar testing. NAL is accredited under the Papua New Guinea laboratory accreditation scheme (PNGLAS) for the proximate analysis of stockfeeds and for the analysis of water for trace metals and potability, soils and foliar samples. The Laboratory has equipment for atomic absorption spectroscopy, high performance liquid chromatography, gas chromatography, Fourier transform infra-red spectroscopy, ultra violet/visible spectroscopy and a clean room for trace metal analysis. NAL is run by 14 technical staff. Its clients include many national and local government departments and private companies. These services are at the disposal of departments of the University, its staff and students.

f) Management Development Centre

The Management Development Centre provides the Government offices

and private companies with training courses on management, human resources development etc. The courses are administered by UDC.

g) Unitech Development and Consultancy Company (UDC)

Unitech Development and Consultancy Pty. Ltd. (UDC) was created in 1987 to promote the commercial operations of the University in a professional and profitable manner. It has brought together the diverse commercial units operating within various University Departments. UDC provides consultancy services, organises short courses, provides architectural services, provides support services to Audio Visual Unit, and operates Civil Engineering Commercial Unit, Electronic Services Units, the Guest House, the Insect Farming and Trading Agency, the Management Development Centre, the National Analysis Laboratory and the Veterinary Clinic. These services are operated in cooperation with the teaching and other staff members of the University.

The activities of the University in the teaching, research, community development and staff training are conducted at the teaching departments and academic service facilities mentioned above. Educational equipment of the University was first financed by the Australian Government at the time of the establishment and then gradually purchased by the University's own funds. Almost all departments have basic equipment. However, some pieces of equipment are 20 to 30 years old and the teaching departments lack equipment indispensable for maintaining the technological education level corresponding to the rapidly advancing technology. The University requests the Government to renew educational equipment every year. However, the budgetary constraints of the Government have not been able to afford the Capital Budget since 1994. In these circumstances the Department of Education has submitted a request for a Grant Aid of the Japanese Government to provide the University with equipment necessary for the students' experiments and practice. The requested items are listed in the Table 1-3.

Table 1-3 List of Requested Equipment

Name	Qty	Name	Qty
A. TARAKA CAMPUS		9 DEPT. OF MATHEMATICS AND COMPUTER SCIENCE	
1 DEPT. OF CIVIL ENGINEERING		New Computer Laboratory Equipment	1 Lot
Maps and aerial photographs	1	Lecture Theatre	
A1 flat bed reprographic machine	1	Audio-Visual and Equipment	1
GPS	3	Computers	1 Lot
Plate Loading Apparatus	3	Software	1
Los Angeles (LA) Machine	1	Others	1 Lot
Data Logger	1	10 DEPT. OF BUSINESS STUDIES	
Microscope	1	Teaching and Classroom Equipment	
Analytical Balance	1	Overhead Projector	4
Others	1 Lot	Overhead Projector Panel	4
2 DEPT. OF ELECTRICAL & COM. ENGINEERING		Others	1 Lot
Digital Signal Processing System	1	Computer Network Equipment	1 Lot
Various Assembly Kits	1 Lot	Computer Laboratory Refurbishment	1 Lot
Demonstration Models	1 Lot	Security and Environment Protection	
Computer with Software	1 Lot	Voltage regulators/surge protectors	25
Micro Processor Training Kits	1 Lot	UPS	5
Frequency Counter	10	Others	1 Lot
Solar Equipment	1	11 DEPT. OF APPLIED PHYSICS	
Others	1 Lot	Frank-Hertz Experimental Apparatus	1
3 DEPT. OF MECHANICAL ENGINEERING		Hall Effect	1
Lathe Machine	1	Milikan Apparatus	1
Printer/Plotter	1 Lot	RF Signal Generator	1
FFT Spectrum Analyser	1	Chart Recorder	1
Drafting Machines	5	UV Pulsed Lasers	2
Computers for CAD Course	1 Lot	Portable X-ray Set	1
CD ROM Recorder	3	Others	1 Lot
Software	1 Lot	12 DEPT. OF APPLIED SCIENCE	
Universal Testing Machine	1	Centrifuge	1
Test Equipment	1	Calorimeter	1
Various Test Benches	1 Lot	pH Meter with Electrodes	1
Brinell Hardness Testing Machine	1	Photomicrograph System	1
Electric Discharge Machining	1	Sieve Shaker with Set of Sieves	1
Others	1 Lot	Refractometers	2
4 DEPT. OF SURVEYING AND LAND STUDIES		Homogeniser	1
GPS	1	Atomic Absorption Spectrophotometer	1
Automated Surveying Systems Total Station	1	Others	1 Lot
Theodolites	1	13 DEPT. OF LANGUAGE AND COMMUNICATION	
Surveying Base Equipment	1	Personal Computer	1 Lot
Image Setter, GIS Software & WS	1	Server	1
Upgrade to Spatial Information System Lab.	1	Printer	3
Others	1 Lot	Network	1
5 DEPT. OF MINING ENGINEERING		App. software	1
Computing Laboratory Equipment	1 Lot	Others	1 Lot
Office and other Equipment	1 Lot	14 COMPUTER SERVICES CENTRE	
Universal Testing Machine	1	Classroom Computer	
EWS(SUN)	1	Student Work Station	1 Lot
X-ray Diffractometer	1	File Server with UPS	1 Lot
Particle Size Distribution Analyser	1	Printer server 1 and printer 2	1 Lot
Microphotometry System	1	Data Show Display Projector	1 Lot
Fume Scrubber	2	Cabling, etc.	1 Lot
Dust collector	1	Others	1 Lot
Electronic muffle furnace	1	Standby Generator	1
Others	1 Lot	E-Mail and Internet Service	1
6 DEPT. OF ARCHITECTURE & BUILDING		B. VUDAL UNIVERSITY COLLEGE	
Glidon Screen	1	CLASSROOM/LIBRARY ACCESSORIES	
Drawing Boards	25	Laboratory Equipment	
Parallel Drafting Rules	25	Spectrophotometer	1
Television Sets	2	Kjeldahl Nitrogen Distillation Equipment	1
Student Personal Metal Locker	60	Others	1 Lot
Personal Computer	1 Lot	Teaching Apparatus and Accessories	
CAD software	1	Triple Balances	10
UPS System	1	Ray Boxes	10
Others	1 Lot	Others	1 Lot
7 DEPT. OF AGRICULTURE		FARM CULTIVATION	
Vehicle	4	Horsepower Tractor	1
Kjeldahl Scrubber	2	Farm Utility Car	1
Growth Chambers	3	Others	1 Lot
Computer	1 Lot	CLASSROOM/LIBRARY ACCESSORIES	
Post Harvest Laboratory	1	Horsepower Tractor	1
Soil Bin Workshop Extension	1	Tachometer	2
Agriculture Engineering Teaching Workshop	1 Lot	Overhead Projector	4
Agriculture Surveying Equipment	1 Lot	Bus(30 seaters)	1
Others	1 Lot	16lux Double Cab Utility	1
8 DEPT. OF FORESTRY		Others	1 Lot
Compound Microscope	20	ESTATES AND SERVICES	
Tractor/Slasher	1	Arc welding machine	1
Digital Balance	2	Others	1 Lot
Surveying Compass	6		
Others	1 Lot		